ANNUAL FOREST INSECT STATUS REPORT
SEASON 1933.

To Officers in Charge of Organizations:

It is requested that this report be circularized through that portion of your organization interested in forest protection.

James C. Evenden, Entomologist.

Forest Insect Field Station,
Coeur d'Alene, Idaho,
February 16, 1934.

REGION ONE

ANNUAL FOREST INSECT STATUS REPORT

SEASON 1933

This report is prepared for the purpose of summarizing the annual insect-status reports submitted from the ranger districts of Region 1, and of presenting a brief resume of the emtomological activities of the region for the past season. During the ten years that these ranger reports have been submitted, an increasingly valuable historical reference has been compiled at this station. Each year there is an improvement in the data submitted, indicating a better understanding and appreciation of the economic importance of forest insect problems.

This season a new form was used for the presentation of these reports, which is an improvement over the old. The number of questions to be answered were limited to the description of the area infested, the tree species attached, and name of the insect. Such entomological phases as the source of infestation, direction of spread, number of trees attacked, percent of stand kill, present status of outbreak, etc., were to be given under remarks, as the reporting officers reaction to the situation. Though this season's reports showed a marked improvement in these data, it was apparent that many officers were reluctant to offer their reaction to these points. This is regretted, as from such information we are able to draw more logical conclusions than from the direct answers to a few conventional questions. Some rangers gave splendid descriptions of the infestations on their districts, while in other cases, where the situation was known to be equally as serious, the remarks were confined to a very few words.

It is trusted that in subsequent reports there will be no hesitancy on the part of the ranger in offering his reactions to the insect problem of his district. To properly describe these infestations it will, in many instances, be necessary to make a more thorough examination than has been conducted in the past. These annual reports provide the only available source to which one may turn for a picture of existing insect conditions within the district. If this information is to be reliable, it must be based upon authentic data, and each ranger should be granted sufficient time to fully satisfy himself as to existing conditions. Some field work is necessary in connection with all situations if a worth while report is to be submitted. Areas previously reported as uninfested should be examined annually to determine if the same condition exists. Though special training is not necessary, it is essential that the examining officer have a general knowledge of his problem and that the responsibility and seriousness of the task be fully realized. It is believed that there is still a tendency to minimize the importance of the so-called normal infestations. A few infested trees encountered along trails etc. should be viewed with alarm, calling for a more thorough examination to determine the actual status of the infestation. Such examination should be made a special order of business, as it has been found that they can not be adequately made in connection with grazing reconnaissance, trail inspection, etc.

Summary of Ranger Reports

One hundred and sixty-one reports were received from 98 ranger districts. This is an increase over last season of 7 reports, but a reduction of 14 ranger districts, which is no doubt due to consolidations. Of these reports, 7 were negative in character, while 154 of them listed various insect infestations. Of these infestations, 48 were considered as increasing, 60 as decreasing, and 46 as normal or stationary. There were 121 Dendroctonus outbreaks recorded, 11 spruce budworm, 4 true fir beetle (Scolytus ventralis), and 18 miscellaneous reports, 3 being of tree diseases. These miscellaneous reports included the following insects:

Gallatin - Needle tyer - (Argyrotaenia piniatubana)
Ips sp.
Spruce gall aphis (Adelges cooleyi)
Spider mite (Oligonychus americanus ?)
Alpine fir beetle (Dryocoetes confusus)
Lodgepole pine blister rust (Peridermium harknessii)

Kaniksu - White pine aphid (Pineus pinifoliae)

St. Joe - Alder flea beetle (Altica bimarginata)
Cedar needle disease ?

Cabinet - Douglas fir cone moth (Enarmonia pseudotsugae)
Oregon engraver beetle (Ips oregoni)
Alpine fir beetle (Dryocoetes confusus)
Tortoise shell butterfly (Aglais californica)

Custer - Pine leaf scale (Chionaspis pinifoliae)

Flathead - Larch case bearer ?

The following table shows the status of the different insects reported:

SUMMARY OF INSECT INFESTATIONS REPORTED

INSECT	YEAR	INCREASING	DECREASING	NORMAL	TOTAL
Mountain Pine Beetle D. monticolae Hopk.	1933	33	45	17	95
	1932	64	20	12	96
	1931	51	27	14	92
	1930	60	24	14	98
	1929	46	14	23	82
	1928	33	13	10	56

Continued SUMMARY OF INSECT INFESTATIONS REPORTED

Western Pine Beetle *D. brevicomis* Lec.	1933	5	2	1	8
	1932	2	2	0	4
	1931	2	1	1	4
	1930	4	1	0	5
	1929	0	3	4	7
	1928	5	4	2	11
Douglas Fir Beetle *D. pseudotsugae* Hopk.	1933	5	4	5	14
	1932	13	1	5	19
	1931	2	5	1	8
	1930	4	2	4	10
	1929	2	1	2	5
	1928	5	4	2	11
Lodgepole Pine Beetle *D. murrayanae* Hopk.	1933	0	0	0	0
	1932	0	0	0	0
	1931	0	0	1	1
	1930	0	0	1	1
	1929	-	-	-	-
	1928	-	-	-	-
True-Fir Beetle *Scolytus ventralis* Lec.	1933	4	0	0	4
	1932	5	0	0	5
	1931	0	0	1	1
	1930	2	0	0	2
	1929	1	0	0	1
	1928	0	0	1	1
Spruce Budworm *Cocoecia fumiferana* Clem.	1933	3	4	4	11
	1932	3	7	1	11
	1931	1	7	1	9
	1930	6	5	6	17
	1929	4	9	3	16
	1928	11	12	4	27

From the preceding table it will be seen that this season's reports indicate some slight changes in the status of conditions. Though

practically no change in the total number of mountain pine beetle infestations, a reduction in their severity is shown. The number of western pine beetle outbreaks reported is larger than at any time during the history of these records. The indicated reduction in number and severity of the Douglas fir beetle infestations is not true in several forests. No outbreaks of the lodgepole pine beetle were reported, and no changes shown in the status of the true fir beetle and spruce budworm.

MOUNTAIN PINE BEETLE INFESTATION
WHITE PINE

There has been but little change in the reports of mountain pine beetle infestation in white pine during the past season. The following table shows the status of these reports since 1928:

Year Reported	No. of Reported White Pine Infestations	Increasing Infestations	Decreasing or Normal Infestations
1933	24	7	17
1932	25	10	15
1931	26	11	15
1930	42	22	20
1929	40	24	16
1928	27	18	9

The only conclusions that can be drawn from the preceding table is the number of reports, each considered as an individual situation, that have been received during this period. The following table gives in more detail a comparison of the 1932 and 1933 reports:

Forest	No. of Reports 1932	No. of Reports 1933	No. Increasing Infestations 1932	No. Increasing Infestations 1933	No. Decreasing Infestations 1932	No. Decreasing Infestations 1933	No. Normal Infestations 1932	No. Normal Infestations 1933
Blackfeet	2	3	-	1	2	1	-	1
Cabinet	0	1	-	-	-	-	-	1
Clearwater	3	2	3	1	-	-	-	1
Coeur d'Alene	4	5	2	-	2	1	-	4
Flathead	2	2	1	-	1	1	-	1
Kaniksu (Pend Oreille)	8	7	-	1	7	4	1	2
Kootenai	2	0	2	-	-	-	-	-
Selway	0	1	-	1	-	-	-	-
St. Joe	4	4	2	3	1	-	1	-
	25	24	10	7	13	7	2	10

Following the institution of control in the Coeur d'Alene National Forest in 1930, which has been continued each subsequent year, the infestation in these valuable timber stands has been reduced from a serious potential epidemic to what can in nearly all cases be considered as a normal infestation. Following the 1933 survey of the forest, control measures were considered as being necessary in only one small drainage. This area was treated in the fall of 1933, and will be the only work necessary against the 1933 infestation. It is hoped that this outbreak has been reduced to a point where natural factors can maintain a normal balance. One can be assured that as a result of this operation the losses have been kept at a minimum, and a severe devastation prevented.

Practically the same condition exists on the Kootenai, where control has been directed against some rather heavily infested areas during the past few years. As a result of these projects the losses have been materially reduced, severe devastation prevented, and in many areas the infestation reduced to a point where no further increases have occurred since the cessation of control. Last fall control measures were directed against a very heavy epidemic in the Pete Creek drainage of the Yaak River. Though this project was very thoroughly conducted, there will undoubtedly be some maintenance control necessary against the 1934 infestation. Four small areas, with a total of 1,400 trees, have been recommended for control in the spring of 1934.

On the Blackfeet and Flathead Forests, there are serious infestations of this insect which have existed for the past few years and caused the destruction of large volumes of white pine. On the Blackfeet the officers feel that the outbreaks are decreasing, while on the Flathead there would seem to be but little, if any, change in conditions. The outbreaks on these forests have reached such a magnitude and cover such a tremendous acreage that thoughts of control are not feasible at this time due to the expense of the operation.

On the Kaniksu all of the previously reported outbreaks of this insect in white pine, with the exception of Stony Creek, were considered as decreasing. It is sincerely hoped that this condition will continue, and that no further losses will occur as the devastation within this forest has been exceedingly heavy. In several of these areas the devastation during the first few years of the outbreak was so severe that the remaining timber stands were not considered as being of sufficient value to justify the cost of control. We have no accurate data as to the actual amount of the losses; however, it is known that they have been very severe.

On the Clearwater there are two areas (Canyon and Oxford ranger districts) on which white pine, which is in association with a severe lodgepole infestation, is being attacked. These losses are not serious

at this time, though it is difficult to foresee what the future holds in store. On the St. Joe there is one area (Simmons Creek) similar to the Clearwater areas, on which white pine is now being attacked in association with a lodgepole epidemic. A few 1933 attacked white pine were recorded from Mullens Gulch, Cabinet National Forest, which were treated this fall. White pine is reported as being attacked on the Lochsa River of the Selway, though it is believed that the greater portion of this infestation is in lodgepole pine.

MOUNTAIN PINE BEETLE INFESTATION
LODGEPOLE PINE

Though this season there was an increase in number of reports covering outbreaks of the mountain pine beetle in lodgepole, there was a marked reduction in the number of so-called "increasing infestations." In 1931 there were 43 increasing infestations reported, 54 in 1932, and only 29 in 1933. The following tabulation shows the status of the reports received from the different forests:

Forest	No. of Reports 1932	No. of Reports 1933	No. Increasing Infestations 1932	No. Increasing Infestations 1933	No. Decreasing Infestations 1932	No. Decreasing Infestations 1933	No. Normal Infestations 1932	No. Normal Infestations 1933
Absaroka	0	2	0	-	-	1		1
Beaverhead	7	7	7	2	-	4		1
Bitterroot	6	6	4	1	2	3		2
Blackfeet	4	3	1	-	2	2	1	1
Cabinet	0	1	-	1	-	-		-
Clearwater	2	8	2	7	-	1		-
Coeur d'Alene	1	0	-	-	-	-	1	-
Custer	3	1	-	-	1	-	2	1
Deerlodge	6	6	6	2	-	4	-	-
Flathead	2	3	2	2	-	1		-
Gallatin	5	6	4	2	-	4	1	-
Helena	7	6	4	1	2	5	1	-
Kootenai	2	2	2	2		-		-
Lewis & Clark	1	0	-	-	1	-		-
Lolo	10	9	9	-	1	9		-
Nezperce	5	5	5	-	-	4		1
Selway	4	4	4	3	-	1		-
St. Joe	4	6	4	6	-	0		-
	69	75	54	29	9	38	6	7

From the preceding data it is rather evident that there has been no marked abatement in the severity of this infestation during the past year, though this season's reports do show a reduction in the number of increasing infestations. Though on some areas the outbreaks have subsided somewhat due to various causes; on others there have been marked increases. New outbreaks have been reported which do not help to lessen the seriousness of the situation.

A heavy infestation now covers all portions of the Beaverhead, Bitterroot and Deerlodge National Forests. On the Beaverhead and Bitterroot a large percent of the timber stand has already been destroyed, and remaining areas are apparently doomed. It is rather difficult to depict the appearance of such areas as the Big Hole Basin, as one can hardly realize the tremendous areas upon which the timber has been destroyed. A very outstanding reduction of 95%, or a drop from 17,500,000 infested trees in 1932 to 869,000 in 1933, occurred in the Beaverhead infestation during the past season. Though there are several factors which may have contributed toward this condition, it is believed that the extremely low temperatures of the past winter are primarily responsible. It is not known if this natural decrease will be maintained or if, through the elimination of the factors contributing to this brood mortality, the infestation will rebuild to its former severity.

A number of outbreaks were reported from the Helena, which borders the now heavily infested Deerlodge, though only one was considered as increasing. It is trusted that conditions are as stated, though one can hardly expect this forest to escape the devastations which have occurred on the adjacent areas. A peculiar situation exists on the Gallatin Forest, which has been covered by an insect survey for the past three years. Infestations of the mountain pine beetle were found on this forest in 1931, however, during the subsequent seasons they have remained at about the same degree of intensity. When these infestations were discovered it was expected that serious outbreaks would soon develop, though as yet these expectations have not materialized, and it is hoped that present conditions will continue.

Throughout the forests of Montana and Wyoming, infestations of this insect are to be found in nearly all white bark pine and limber pine stands. Some of these areas are surrounded by lodgepole pine stands, the future of which depends upon the interchange of hosts. Such infestations exist on the Gallatin, Absaroka, Beaverhead, Deerlodge, and possibly the Helena, as well as the Yellowstone and Wyoming forests. The source of these outbreaks is a debatable issue. Flights of beetles from other areas may have been responsible or the outbreaks could have developed locally. There is evidence of old work in many of these areas, but there would seem to be a gap between this old work and the present situation. Though we do not know the exact relationship of these two hosts

of the mountain pine beetle, it is believed that white bark pine or limber pine is preferred and will be attacked as long as such material remains available. However, when white bark pine is no longer available, it is believed that adjacent lodgepole pine will be selected for attack.

A light scattered infestation of this insect was reported from one ranger district on the Custer, which is assumed to be a normal condition. One report was received from the Lewis and Clark in 1932, but no follow-up was made this season.

A serious infestation of this insect has developed in the Lolo Forest during the past few years, which is apparently spreading northwestward into the Cabinet. This season's reports show that the outbreak now covers practically the entire lodgepole pine acreage of the Lolo, with a few severe spots of infestation beginning to appear in the Cabinet. Reports from the Lolo indicate that this infestation is practically at a standstill, with very little, if any, increase in the 1933 attack. This infestation undoubtedly originated from the heavily infested Bitterroot and Lolo Forests lying to the south.

In northern Idaho a situation exists which is comparable to the Montana epidemic. A few years ago spots of infestation began to appear in the Nezperce Forest, and in a very few yearscovered all lodgepole pine areas. This outbreak also spread rather rapidly through the Selway Forest, where conditions similar to the Nezperce now exist, and at the present time there are areas with heavy infestation distributed throughout the Clearwater, with some alarming conditions beginning to appear in the St. Joe. It has been assumed that this outbreak originated from the Salmon Forest, where a severe epidemic swept the lodgepole areas some few years ago. Though a logical deduction, and perhaps correct, it is possible that the Bitterroot, also heavily infested and adjacent to these areas on the east, could have at least contributed to this situation. Regardless of the original source of the insects, the infestation has progressed northward through the Nezperce, the Selway, and is now present in a serious epidemic status on the Clearwater, with a few advance spots on the St. Joe. The importance of this situation can not be lightly passed by. Its future economic seriousness lies in the possibility of this insect changing from lodgepole to white pine. One hesitates to make a prediction as to this occurrence, due perhaps to the seriousness of the devastation which may result.

WESTERN PINE BEETLE INFESTATION
PONDEROSA PINE

The 1933 reports show an increase in the number of western pine beetle infestations in ponderosa pine. As 5 of the 8 reported infestations are listed as increasing, these reports may be an indication of serious losses to follow. The following table shows the status of the reports received from the different forests:

Forest	No. of Reports 1932	1933	No. Increasing Infestations 1932	1933	No. Decreasing Infestations 1932	1933	No. Normal Infestations 1932	1933
Cabinet	1	1	-	-	1	1	-	-
Custer	1	1	-	-	1	-	-	1
Flathead		1	-	1	-	-	-	-
Kootenai		2	-	2	-	-	-	-
Lolo	1	0	1	-	-	0	-	-
Nezperce	1	2	1	1	-	1	-	-
Selway		1	-	1	-	-	-	-
	4	8	2	5	2	2	0	1

Of the infestations listed there are five that are considered as increasing and warranting further consideration. The Flathead reports a potentially serious outbreak, for though it is limited to a small acreage it is estimated that 15% of the stand has beer destroyed during the past two years. The Kootenai reports two increasing outbreaks, and recommends the institution of control for one of them. Though only one of the two outbreaks reported from the Nezperce is considered as increasing, the situation is considered as being sufficiently serious to justify further observations. The Selway reports a peculiar situation in that 70 trees were infested this season on a small area of ten acres. This is an extremely heavy infestation, and can be taken as an indication of an infestation extending over a larger area than reported.

The western pine beetle is present in an endemic status within all of our ponderosa pine stands, and though we have had some sporadic outbreaks of this insect, there have never been any serious epidemics recorded. However, these areas should be kept under observation, in order to forestall, if necessary, the development of serious outbreaks.

DOUGLAS FIR BEETLE INFESTATION
DOUGLAS FIR

This season's reports showed not only a reduction in the number of Douglas fir beetle infestations but in their severity as well. The following table shows the status of the reports from the different forests:

Forest	No. of Reports 1932	No. of Reports 1933	No. Increasing Infestations 1932	No. Increasing Infestations 1933	No. Decreasing Infestations 1932	No. Decreasing Infestations 1933	No. Normal Infestations 1932	No. Normal Infestations 1933
Absaroka	1	1			1			1
Beaverhead	0	1						1
Bitterroot	1	1			1	1		
Blackfeet	5	3	2	3	1		1	
Cabinet	2	1	2	1				
Coeur d'Alene	1	-	1					
Flathead	5	6	4	1	1	2		3
Kaniksu	1	-	1					
Lolo	2	1				1		
Nezperce	1	-						
	19	14	10	5	4	4	1	5

Decreasing outbreaks were reported from the Absaroka, Beaverhead and Bitterroot, which are considered as being but normal infestations. On the Blackfeet and Flathead, infestations of this insect are reported as existing throughout most of the Douglas fir stands of the two forests. This is a situation which has been foreseen for some time, as previous reports have indicated the existence of a serious condition. Furthermore, a serious infestation of this insect has been present on the west side of Glacier Park for the past few years. The thoughts of controlling these outbreaks are no doubt prohibitive, as the value of the timber at stake would not seem to justify the cost of the operation. A large percent of the timber stand is already recorded as being destroyed, though this varies somewhat for the different ranger districts. The Cabinet reports an outbreak which has been considered as a Douglas fir beetle infestation, though the insect is recorded as the true-fir beetle. The groups of infested trees are considered as enlarging, and are distributed over the entire district. It is evident that we are still losing a large volume of Douglas Fir due to the attacks of this insect; however, timber values do not warrant the institution of control.

SPRUCE BUDWORM INFESTATION

There was no change in the number of budworm infestations reported this season, though there was one less increasing outbreak recorded. Some of these outbreaks have been reported for a number of years, and though not as aggressive as in the past they seem to persist with remarkable tenacity. Others have died down after a period of years, and upon this evidence some prophesies have been made as to the duration of other outbreaks, which have nearly always been in error. The following table shows the status of the reports from the different forests:

Forest	Host	No. of Reports 1932	No. of Reports 1933	Number of Increasing Infestations 1932	Number of Increasing Infestations 1933	Number of Decreasing Infestations 1932	Number of Decreasing Infestations 1933	Number of Normal Infestations 1932	Number of Normal Infestations 1933
Absaroka	Douglas Fir: Alpine Spruce	2	2	1	-	1	-	-	2
Clearwater	Douglas Fir: White Fir	1	1	1	-	-	-	-	1
Coeur d'Alene	Douglas Fir: White Fir	1	1	1	1	-	-	-	-
Flathead	White Fir	-	1	-	1	-	-	-	-
Helena	Douglas Fir: White Fir	2	2	1	-	1	2	-	-
Nezperce	Alpine Fir: Douglas Fir: White Fir: Spruce	1	1	-	-	1	1	-	-
Selway	Alpine Fir	4	3	2	1	1	1	1	1
		11	11	6	3	4	4	1	4

The status of the outbreaks on the Absaroka seem to have changed but little during the past season. Though considerable timber is reported as having been killed, the values are considered as being but very small. The infestation on the Clearwater is considered as increasing and spreading in a westerly direction. All Douglas fir trees are attacked, but no 100% kills are recorded. The Coeur d'Alene outbreak, though considered as covering a larger acreage than in 1932, would seem to be dying out, and should not persist for many more years. The Flathead reports budworm work for the first time, but states that only one tree

was infested. This may be the inception of a budworm infestation, or it could possibly be Peronea variana, another species of budworm, which is quite common and confines its attacks to single trees. Of the two infestations reported from the Helena, one is considered as being no longer in existence. However, the other outbreak is still spreading, and large areas of young growth are reported as being destroyed. On the areas of larger sized timber it is estimated that at least 60% of the trees have been or will be destroyed. The Nezperce reports the outbreak on that forest as decreasing, with no damage to the 1933 foliage. There would seem to be little change in the seriousness of the budworm situation on the Selway, though one of the outbreaks is shown to be practically extinct. The other two are spreading into new areas, with resulting destruction to the defoliated trees.

SECONDARY INSECTS

Of the secondary insects which have been reported, there are a few which seem to occupy a position of economic importance. The true-fir beetle (Scolytus ventralis) is destroying large volumes of white fir throughout the region. On the Kaniksu and other white pine forests, the pine aphid (Pineus pinifoliae) is becoming of serious importance in white pine reproduction. The alder flea beetle (Altica bimarginata) defoliated large areas of willow and cottonwoods in northern Idaho.

1933 FIELD SEASON

Yellowstone Park Bark-Beetle Control Project

During the winter of 1932-33, severe mortality occurred in the broods of the mountain pine beetle in lodgepole pine throughout the Beaverhead and adjacent forests. As a result of this mortality, which amounted to 95% on the Beaverhead, it was thought that if this condition prevailed throughout the general area, the reopening of the Yellowstone project, which was discontinued in 1931, might prove to be a feasible procedure. To secure information necessary to determine this possibility, surveys were made of the Beaverhead and Gallatin Forests of Region 1; Targhee, Teton, Wyoming, Caribou and Cache Forests of Region 4; and the Yellowstone Park. The surveys of the Beaverhead, Gallatin and Targhee Forests were under the supervision of the Bureau of Entomology, while on the other areas the work was directed by local officers. The data secured from these surveys indicated that the brood mortality had not been as extensive, or as severe, as had been hoped for, and that instead of there being a reduction in the infestation of these areas, increases had occurred in all forests except the Beaverhead. However, the data

did indicate that the project now appeared fairly feasible from an entomological position, and its reopening has been recommended on that basis only. A decision as to justifying the large expenditure necessary has not as yet been reached.

Kootenai National Forest

Control measures were again conducted against outbreaks of the mountain pine beetle on three rather small white-pine areas on the Kootenai Forest in the spring of 1933. During this operation there were 908 trees treated at a cost of $3,571. Surveys conducted this summer indicate that in one of these areas there has been a light re-infestation, which will require treatment in the spring of 1934. Fall control, directed against 1933 attacks of the mountain pine beetle, was conducted in the Pete Creek drainage of the Yaak River, where a very heavy infestation existed. The results secured from this project, which involved the treatment of 2,570 trees at a cost of $11,276, will not be available until after the 1934 attacks of these beetles.

Coeur d'Alene National Forest

The Coeur d'Alene project, directed against the mountain pine beetle in white pine, was continued in the spring of 1933, with work being conducted on eight small areas, totaling 21,677 acres. During this operation 4,552 infested trees were treated at a cost of $27,127. Following this season's survey there was only one area, Cascade Creek, infested to a degree sufficient to justify control. As recommended, control measures were instituted during October and 887 trees treated at a cost of $9,287.99.

Shoshone National Forest

Control measures were instituted within the Cody Canyon of the Shoshone Forest against an outbreak of the Douglas fir beetle in the fall of 1931. This infestation was centered in Douglas fir stands weakened through previous defoliation by the spruce budworm. During the first year of this project some 12,000 trees were treated at a cost of $0.76 per tree. In 1932, on a much larger acreage, some 8,158 trees were treated at the same low cost of $0.76 per tree. In the fall of 1933, on a greatly reduced acreage, there were approximately 2,500 trees treated, though a final report of this project has not as yet been made available. It is expected that there will be but very little, if any, additional work necessary on this project.

Glacier National Park

Recommendations were made for the institution of fall control against a small outbreak of the Douglas fir beetle in the scenic Douglas fir stands adjacent to St. Mary's Lake. Though this project was started in the middle of October, a severe snowstorm necessitated the closing of the camps for the season. It is not known whether it will be possible to complete this project in the spring of 1934 prior to the emergence of the insects.

Yellowstone National Park

An experimental control project was instituted in the spring of 1933 on Mount Washburn, Yellowstone Park, against an infestation of the mountain pine beetle in white bark pine. The purpose of this experiment was to determine the feasibility of instituting control against such outbreaks in small areas, without considering the infestation in other areas, a few miles away. Unfortunately, this project was not completed, so it has been impossible to draw any conclusions.

Grand Teton National Park

Two small projects, similar to the Mount Washburn operation in the Yellowstone, were instituted in the Grand Teton Park in the spring of 1933. Some 280 infested white bark pine were treated along the newly constructed Glacier and Death Canyon Trails. A clean-up of the infestation on these areas was made this fall, and only 74 trees were found to be infested, which is a reduction of 73 percent over the 1932 attacks treated in the spring of 1933. Though this experiment appears satisfactory at this time, there is no assurance of permanency in the results. This fall's operation included the Cascade Creek area, where a new trail had also been recently constructed.

Region Four Control Projects

During the past season control projects, directed against outbreaks of the mountain pine beetle in lodgepole pine, were instituted on the Wyoming, Caribou, Cache, Wasatch, Ashley and Uinta National Forests. As complete reports of these projects have not been made available, the number of trees treated and the expenditures are not given here.

Region Two Projects

Control measures for the suppression of Black Hills beetle outbreaks in white bark, ponderosa, and lodgepole pine were instituted on the Montezuma, Medicine Bow, Roosevelt, Shoshone, Cochetopa, Holy Cross and White River National Forests during the 1933 season.

SUMMARY OF ENTOMOLOGICAL INVESTIGATIONS

The economic importance of bark beetles in this region has resulted in practically the entire investigative strength of the Coeur d'Alene station of the Bureau of Entomology being devoted to their study. These efforts have been directed towards the developing of more effective and economical methods of bark-beetle control, as well as a better understanding of the environmental effects of control operations. All suggested superficial leads have been tested and present studies are now confined to such basic fundamental items as seasonal histories, host-selections, flight and migration habits, parasites and predators, association with other insects, analysis of going projects, etc. It is hoped that from such fundamental data methods of control can be developed which will not only be effective in reducing bark-beetle outbreaks but will give some semblance of permanency to the results secured.

An intensive study of the insects predacious and parasitic upon the mountain pine beetle was instituted last season. During this season's control on the Coeur d'Alene some radical departures from former practices were made in order to take advantage of these beneficial insects. Trees containing a definite percentage of parasites were left untreated, where heretofore an attempt has been made to secure a 100 percent treatment. This project, with many experimental tests, will be continued indefinitely, as it is sincerely believed that it is only from a better utilization of these beneficial insects that control operations can be made successful.

Whenever possible, going control projects have been studied in the hopes of improving the effectiveness of present methods. This has proved to be a difficult undertaking due to the difference in the personnel problem. Adequate supervision stands out as one of the necessities for successful control. The daily checking of spotting crews has been found to result in an increased efficiency, and such checking should be a part of every project.

Experimental control projects directed against small outbreaks of the mountain pine beetle in white bark pine have been instituted for the purpose of determining if successful results will follow the treatment of such small areas. Though very satisfactory results have been secured, there is no assurance that they will be permanent.

To learn more of the flight habits of the mountain pine beetle, further experiments were continued this season. Traps were placed on ridges and peaks, and held aloft at high elevations by large Weather Bureau kites. Bark beetles were taken at a distance of 15 miles from

the nearest timber. These experiments will be continued during the coming season.

To offer some means of protecting lodgepole pine trees from the attacks of the mountain pine beetle during epidemics, a series of experiments have been conducted in an effort to render such trees immune. Different chemical sprays have been tested, as well as mechanical barriers such as wire cloth, thick paste, cement, etc., none of which seems to offer a great deal of promise.

Tree medication was again tested in white pine, with the same successful results secured the previous season. To determine if this method of control would be feasible in actual practice, an ECW project was instituted, and some 500 trees treated near Sullivan Lake, Kaniksu National Forest. Treating crews were able to treat on an average of 5 trees per man-day, which is more than the output of present methods. The actual results of this project will not be known until in April or May, when a final examination will be made of the treated trees.

Insects injurious to forest plantations have been studied on the Nebraska National Forest for the past few years, and this study will be continued during the coming season. Two species of tip moths and a pitch moth in this area threaten to mutilate or destroy the plantings of certain tree species in this entirely man-made forest.

The annual survey of the severe mountain pine beetle infestation in the lodgepole pine stands of the Beaverhead Forest was again conducted during the past season. The purpose of this survey is to secure information relative to the rate of spread, severity of the destruction, percent and character of the stand remaining after the epidemic has passed, duration of outbreaks within an area, and susceptibility of different age classes, timber types, exposures. Mention has already been made of the severe drop which occurred in the Beaverhead infestation this season. This reduction of 95 per cent is believed to be due primarily to the low temperatures of the past winter.

A study of the Oregon engraver beetle (Ips oregoni) has been completed during the past season. A thorough understanding of the confusing seasonal history has permitted a more accurate application of control measures.

Studies of the factors contributing to the increase or decrease of insect epidemics have received some attention. Such phases as forest fires, logging slash, windthrow, thinning operations, etc., have been given some attention, though more time should be given their study.

CONCLUSIONS

The outstanding feature of the 1933 Ranger Reports is the infestation which has developed during the past few years throughout the lodgepole pine stands of the Nezperce, Selway and Clearwater National Forests, and is now appearing in a few centers of infestation on the St. Joe Forest. The seriousness of this situation can not be minimized, and we can only hazard a guess as to what the future may hold in store. Not only are the lodgepole stands of these forests apparently doomed to destruction, but with the depletion of this supply of host material the danger of this insect attacking the valuable white pine forests of the Clearwater and St. Joe National Forests greatly enhances the seriousness of the situation. The institution of artificial control measures against the existing lodgepole pine infestation with the idea of preventing future depredations in white pine would be a tremendously expensive operation. To postpone the institution of control until such depredations are at hand may possibly be a safer policy to follow, though perhaps a more expensive one when timber losses are considered. In future plans of forest protection a repetition of such devastating insect outbreaks must be prevented. It is difficult to depict the appearance of a lodgepole pine forest after it has been swept by such an epidemic. Mountain sides - thousands and thousands of acres - turn red with the discolored foliage of dying trees - trees which in a few years fall to the forest floor, leaving impenetrable tangles of inflammable material which lasts for decades. In our white pine forests these outbreaks, though not as sweeping as in lodgepole, destroy a large percent of the merchantable timber, leaving a forest of old snags, the seriousness of which is fully appreciated, and eventually results in a complete change of forest types. The solution of forest-insect problems lies in the prevention of epidemics rather than their suppression. To achieve these results outbreaks must be recognized and reported while in their incipiency, and prompt action taken to suppress them though at that time their seriousness may not be apparent. Field officers must carry the same sense of responsibility toward their insect problems as they do toward fire, trespass cases, etc., for through the neglect of the so-called "harmless or normal bug tree" serious losses may occur.

In commenting upon the new form which was adopted this year for the submission of the ranger reports, the writer personally believes that it is an improvement over that previously used. However, it is again desired to impress upon officers submitting these reports the necessity for more extensive remarks. Questions were purposely omitted as it was believed that the reaction of the reporting officer would be of more value in analyzing these situations than the perfunctory answers to a few set questions. It is gratifying to note the increased interest

displayed by forest officers toward their forest-insect problems. Though we have asked that more attention be given to the officer's reaction to the situation reported upon, the data received shows satisfactory improvement and progress and presents a very clear and valuable picture of existing forest-insect conditions within the region. The Coeur d'Alene station desires to be of every possible assistance to interested parties in helping them to secure better understanding of insect problems, and it is trusted that all forest officers will continue to call upon this station for information and assistance.

Respectfully submitted,

James C. Evenden
Entomologist

Approved,

Elers Koch
Chief of Management